



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 13, 1868.

Announcements by the Council.

NOTICE TO MEMBERS.

The One-Hundred-and-Fifteenth Session of the Society will commence on MONDAY,* the 23rd NOVEMBER inst., when the Opening Address will be delivered by Lord HENRY G. LENNOX, M.P., Chairman of the Council.

The following are the dates of the Wednesday evening meetings, the chair being taken at 8 o'clock :—

1868. November	—	—	23*	25	
„ December	2	9	16	23	—
1869. January	—	—	20	27	
„ February	3	10	17	24	
„ March	3	10	17	—	31
„ April	7	14	21	28	
„ May	5	12	19	26	
„ June	—	—	—	—	30†

For the Meetings previous to Christmas, the following arrangements have been made :—

NOVEMBER 23.—Monday.—Opening Address by Lord HENRY G. LENNOX, M.P., Chairman of the Council.

NOVEMBER 25.—“A Glance at the Past and Present of the Society of Arts, with some Suggestions as to the Future.” By S. T. DAVENPORT, Esq., Financial Officer of the Society.

DECEMBER 2.—“Further Notes on the Productive Industries of Natal.” By Dr. MANN, Superintendent of Education and Special Commissioner for the Colony.

DECEMBER 9.—“On the Theory of Boiling, in connection with some Processes in the Useful Arts.” By CHAS. TOMLINSON, Esq., F.R.S., F.C.S.

DECEMBER 16.—“On Artificial Freezing.” By Dr. B. H. PAUL.

DECEMBER 23.—“Description of the Electric Organ.” By HENRY BRYCESON, Esq.

A book of blank Tickets of Admission to the Meetings is now being sent to each Member, who is privileged to introduce two friends to each Meeting on their presenting orders signed by him. Additional Tickets will be forwarded on application.

The first Course of Cantor Lectures for the ensuing Session will be “On the Aniline or Coal Tar Colours,” by W. H. PERKIN, Esq., F.R.S., and will consist of three Lectures, to be delivered on Monday Evenings, the 7th, 14th, and 21st December, at Eight o'clock.

* As the Elections render it impossible for the Chairman of the Council to attend on the 18th inst., the Opening Meeting is unavoidably postponed to Monday, the 23rd of November.

† The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

Other courses are being arranged, particulars of which will appear in the *Journal*. These Lectures are open to Members, each of whom has the privilege of introducing two friends to each Lecture. Tickets for this purpose will be forwarded in due course.

Members are reminded that, should any of their friends wish to join the Society, the opening of the Session is a favourable opportunity for proposing them.

PRIZES.

The Council, at the suggestion of the Food Committee, offer the following prizes for Improved Railway Meat Vans, Milk Vans, and Milk Cans :—

1. For an improved method of conveying meat by rail, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which meat now suffers in its transit by rail. The principal evils to be avoided are—excessive changes of temperature, and injuries by pressure, by handling, exposure to dust, insects, &c. This prize may be awarded for an improved railway meat van or for a travelling meat larder suitable for railways.

Model on a scale of half an inch to a foot to be sent in.

2. For an improved method of conveying milk cans by rail, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary open trucks. The principal evils to be avoided are—the heating and shaking of the milk cans.

Model of an improved railway milk van, on a scale of half an inch to the foot, to be sent in.

3. For an improved railway milk can, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary milk cans, or “churns.” The principal evils to be avoided are—the heating of the milk, and all motion within the can which may cause the buttery particles to separate.

A specimen of the improved railway milk-can to be sent in.

The models and specimens for competition must be forwarded to the Secretary of the Society of Arts before the 1st February, 1869.

SUBSCRIPTIONS.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed “Coutts and Co.,” and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

TECHNICAL EDUCATION.—ROYAL SCOTTISH SOCIETY OF ARTS.

The following are some of the principal portions of an address by the President of the above Society, George Robertson, Esq., M. Inst. C.E., F.R.S.E., concluding the session of 1867-68, delivered at the general meeting of the Society held on the 9th inst.

After a few remarks on the attention that this subject has recently excited, the President said :—

I am not going deeply into the subject of primary education, or farther into the question of compulsory

education, than to say that it appears to me that the time is near at hand when education will be made as compulsory in Great Britain as it is at present in Prussia, Saxony, Massachusetts, and some other countries. I believe that the difficulties, when faced, would be found to vanish; and that, in a short time, no more compulsion would be required than is now required to enforce other branches of the law. We do not regard it as a hardship to be compelled to keep our hands out of our neighbour's pockets; nor would it, I think, be regarded as a hardship to be compelled to send our children to school. The working men of England would soon cheerfully acknowledge, even in the agricultural districts, that a man has no right to profit by the labour of his child to the destruction of its mind.

Every branch of learning, every species of knowledge, every kind of trade, has a science in it, and may be technically taught; that is, the theory of it may be taught so as usefully to be entwined with the practice. Technical education, properly speaking, does not include the manual instruction which can only thoroughly be acquired in the workshop. In every department of industry it is the combination of theory with practice which produces the highest result, and that with a certainty and avoidance of waste quite unapproachable by rule of thumb, or practical knowledge alone.

The value of technical education of the higher kind, though considerable for what are at present called the learned professions, the Church, the law, and physic, is more immediately applicable to the engineer and the architect, the metallurgist and the miner, the agriculturist and the chemical manufacturer. It is also of great service now-a-days to the officers of the navy, army, and mercantile marine. When we think of the numbers engaged in these professions, and their enormous value to the prosperity of England, we at once gain a notion of the importance of the question.

There is but one way of supplying scientific education to the adults of the artisan class, those who have passed the age of school, and are now labouring with the sweat of their brow for daily bread; and that is, by giving them opportunities of attending cheap, but good, systematic courses of evening lectures, similar to those delivered at our admirable School of Arts in Edinburgh. They must also have every opportunity given them of studying the collections of industry and natural science which I hope will soon be formed in every one of our large towns.

The difficulties regarding the scientific education of the future apply, not so much to the present adult generation, as to that which is springing up. In my opinion, the technical education of the young may be commenced along with the common elements of rudimentary education at present taught.

It may be commenced at once throughout the country, in every parish school, and in all classes of society, with the existing machinery, and with the existing subjects of ordinary education, by the science of those everyday subjects being more efficiently taught than it is at present.

The question as to the exact character of the schools, graded or otherwise, it would be desirable to establish, on the large scale, of a purely technical nature, such as those on the Continent, I do not think (and I say it with deference) can be settled just at once. In the present state of matters the country is hardly ripe even for immediate, certainly not for hasty action in this respect. Full use is not made of the technical institutions now in existence, such as the School of Mines; and a healthy and not spasmodic demand must first set in before any purely scientific establishment on a large scale would be quite free from the risk of failure.

Having glanced at the want of success in many of the higher technical schools and colleges which have hitherto been established in England, and traced what

he believed to be the causes for their failure, the president went on to say:—

I trust that the governors of educational institutions (with educational endowments), while considering impending changes, will bear in mind the enormous help they may give towards training the rising generation in the principles of science, and will endeavour to impart that class of information which is most useful to boys who have to make their bread in the middle of the nineteenth century, even though it may not be in exact accordance with the recorded wishes of the pious founders, who lived, it may be, centuries ago.

To give an impetus just at the right moment, we have Mr. Whitworth nobly coming forward and devoting £100,000 of the profits of his own industrial career towards the technical education of his professional brethren. The foundation of a chair of engineering in Edinburgh University by Sir David Baxter, and the better endowment of the chair of agriculture by the Highland Society, are also matters of more than local interest. In both these cases the Government promptly came forward, in answer to the memorials presented to the Treasury, in which, I may mention, our Society took part. The Government appear to act on the principle of helping those who help themselves, but it will not do for them in all cases to wait for localities to stir, for in matters connected with education it very often happens that the place where education is most wanted is the very place that does not know its own wants; and even if wants be suspected, people are not always willing to put their hands in their pockets, unless the wants are very clearly proved.

The Universities are beginning to move in the required direction. Both Oxford and Cambridge are opening their arms to science; the General Council of the University of Edinburgh has agreed to add natural science to its Arts curriculum; the University of St. Andrews has also agreed to include chemistry in its curriculum; the High School, the Edinburgh Institution, and other schools, are taking steps in the same direction; and I cannot help expressing the hope that the trustees of the new Fettes College (which is to be founded on the English system) will bear in mind that Harrow, Rugby, and even Eton, that stronghold of the old system, have at length given way to the science education movement. All these are hopeful signs that the present is no mere surface agitation, and that the system of modern education will be stirred to its inmost depths.

There is one great difference which must always exist between classical and scientific education. The foundation upon which classical education is based was laid centuries ago; the edifice is complete; every stone is laid that ever can be laid, and the building is now exposed to the destructive hand of time. It can never be rebuilt, or even repaired. You may have what is called a classical style—in English, French, German, or other languages, imitations of the original structure—but the classics themselves are dead and gone: the works of their standard writers are embalmed in amber! In this, probably, consists one of their chief values, that for all time the ancient authors remain of the same importance for educational purposes.

Very different is it with science. It is always, and must be always, progressive. It is impossible to conceive any such standard writers, for all time, in science, as Homer and Virgil are in classics. The standards will always be changing, will always be in process of being improved. A student in science is always on the march, is always learning something new. To some minds this may appear a disadvantage, to others an advantage.

I have no wish to depreciate the study of the dead languages as a means, perhaps the best means, of intellectual culture, but the past ought not to be put in too great prominence over the present, for the present is

absolutely necessary, while the past is not. The greater part of mankind make their bread by the present, and not by the past.

Of the practical advantage of the two systems, there cannot be a doubt as to which is the most valuable in this work-a-day world. Take any science—take astronomy, for example. What more wonderful and more useful book is there, written by uninspired man, than the *Nautical Almanac*? As a practical means of making a nation great, rich, and prosperous, it excels all the volumes classical authors ever wrote. . . . Without astronomy, the commerce of England would shrink into a mere coasting-trade, the perils both of sea and land would be enormously increased, and time and space would be a confused chaos.

It is stated in the Report of the Committee of the British Association, that at Rugby, where the study of natural science has been made compulsory since 1864, the masters are of opinion that the school, as a whole, is the better for it, and that the scholarship is not worse. This agrees with the experience of Germany, where both the mathematician and scholars are at least equal to those of England, and where natural science is much cultivated. I think, therefore, that I am fully justified in saying that classics and science need not clash, but might be made to assist each other.

Nor am I willing to concede that the study of the various natural sciences may not, in course of time, as they become better understood and are more systematically taught, prove to the full as valuable a mental discipline as classics, and be as useful towards the cultivation of the mind. And why not? The end and object of the study of the dead languages is the cultivation of literature. The love of letters existed in the mind of man before the dawn of science, and for many a long year the means of cultivating letters existed alone in the dead languages. A happier day has been reserved for us. Science, like poetry, like history, has also its literature—is born a new sister to the lovely nine—and letters may now be cultivated in the works of Herschel, Whewell, Chalmers, and Hugh Miller, as well as in those of Homer, Virgil, Plato, and Aristotle.

One part of the first resolution adopted at the Conference at the Society of Arts (in London), was that "special institutions for technical instruction, including museums, adapted to the wants of the various classes of society, and to the industries of the country, should be established and maintained in the United Kingdom." The words "including museums," were not in the original motion proposed by Dr. Lyon Playfair and seconded by Earl Russell, but were added in accordance with an amendment suggested by one of the representatives of the working-classes, who strongly urged the value of museums and industrial exhibitions, and told us how much they were appreciated by the classes he represented. Indeed, museums are almost a necessity to, and a result of, the extension of science, and one might be established in every large town. I do not mean a vast collection of expensive and miscellaneous curiosities, that is more sensational than useful, but a systematic collection illustrative of the geology, botany, and natural history of the district at least. Every manufacturing town, or the seat of any special industry, should also have an exhaustive collection of the industries of the district, renewed and kept up to the latest improvements.

The appreciation of museums is on the increase; for I see from the last Report from the Science and Art Department that in 1867 the number of persons who visited the various collections in London, Edinburgh, and Dublin was 1,305,374, an increase of 14 per cent. on the previous year.

The convention which has been entered into this year between the princes of Europe, in which they agree, mutually, to assist museums in interchanging casts and copies of national objects for the promotion of art, will

render the formation of collections much easier and less expensive than formerly.

I have heard it objected that the Government Department always talk of technical education as if it were something separate and distinct from general education. How could they do otherwise? There was no science in the ordinary system of national education, and the Department was created for the purpose of grafting science on to it. When the two are thoroughly incorporated they will grow together, but till then they must of necessity be spoken of as distinct.

After enlarging generally upon the system of the Department of Science and Art, and defending the principle of "payment on results," the President continued as follows:—

I think that the people of Scotland ought to lend a helping hand to the Government scheme, and not condemn and criticise it without trial. It is working well in England and Ireland, and will no doubt work better as the weak points are found out and remedied. Nothing is perfect at first, or turned out complete in every detail, and great improvements have been made by degrees on the original scheme. If it be found on trial (and it cannot be proved except by trial) that some modifications are required to suit the system of education or the temperament of the people of Scotland, I have no doubt that Government would take such alterations into careful consideration.

Learned and scientific societies might do a great deal to give a stimulus to the present movement, if they were to follow the good example set by the Royal Geographical Society, who propose to give annually two gold and two bronze medals for general competition among the boys of our principal public schools. The medals are to be given for pre-eminence in political geography and in physical geography, and are to be competed for on the first Monday of May in each year.

The Chemical, Botanical, Geological, and other Societies and Institutions would do well to follow this good example.

To be the gold medallist for the year of one of these societies would be a great feather in a boy's cap. The competition for the medals would keep up a healthy and friendly rivalry between our principal public schools, and would no doubt stimulate the demand for the modern system of education.

After all, perhaps, the most valuable and practical way of promoting scientific education is to rouse up, interest, and convince the employers of labour of its value. Were the manufacturers all over the country thoroughly convinced of this, and determined to show that they appreciated it, by promoting and giving higher wages to those workmen who were technically trained, they would rouse up such a demand as would satisfy the most ardent well-wishers of the cause. It is the employers of labour who may be said to have the great prizes of life to give away, in comparison with which all the medals and certificates a department can grant are only the means towards an end. If the artisans who are employed in engineers' shops find that they get on because they know the principles of mechanics; if those who are engaged in dye-works, glass-works, and the like, find that they advance because they know something about the science of chemistry; if the stone-mason finds himself promoted because he is acquainted with descriptive geometry and drawing; if the miner finds himself the captain of a mine because he understands geology—then there will be no fear for the technical education of either the present or the future race of artisans. And if the rewards of life, whether at college or in professions, be in like manner thrown more open to science-trained men, there need be still less fear for the education of the middle and upper classes. Teachers and schools of science would soon spring up if

the people found that science would "pay." The demand having once been created, it is against all the experience of commerce if the supply does not keep pace with it.

In throwing out these somewhat rambling observations on the science education movement, I have endeavoured not to dogmatise or to enter too much into minute details of how, in my opinion, the objects of the movement may be best promoted. It is an easy thing to say that we require scientific training; it is a very difficult thing to lay down a system which shall at once be satisfactory and complete in all its parts. I doubt if any man living can do that just at present, and I shall certainly not attempt it. It must be done by cautious trial, but without loss of time. For any details of what are the opinions of the men most competent to judge of this subject, I must refer you to the reports of the House of Commons Select Committee, and of the committees appointed by the British Association, and by the Society of Arts. I think the most valuable point of all is that the attention of the country is seriously roused. During last year, about 123,500 persons received direct instruction from the Science and Art Department,—an increase of 10,000 or nearly 9 per cent. on the previous year. Many great minds are thinking of how the nation can be best trained in the principles of science; and no doubt, after a little experience, the question will work itself out to a practical result.

PROPOSED BRIDGE OVER THE CHANNEL.

Many vast engineering feats have occupied attention during the last fifteen years; one of the most daring is that now projected for the purpose of overcoming the obstacles that nature has placed in the way of direct railway communication between the two most important cities of Western Europe, viz., a bridge across the Straits of Dover, by means of which Paris will be brought within a few hours of London, and passengers for the principal cities of the Continent may be enabled to arrive at their destinations in the same carriages in which they started from England, and be saved the inconvenience and delay of embarkation and debarkation involved in the present system, as well as, that misery of all miseries, sea-sickness. The Emperor of the French, to whom, by his Majesty's express desire, the plans of the proposed bridge were submitted, gave its projector, M. Ch. Boutet, considerable encouragement.

From a pamphlet, recently published in England with a view to explain the details of the undertaking, it appears that the proposed viaduct will spring from a point on the English coast, near the Shakspeare Cliff, Dover, at an altitude of 360ft. above the sea, and will terminate on the French coast at an equally lofty hill, known as Cap Blanc Nez, at a short distance from Calais. M. Boutet avoids the enormous expense and risk involved in any attempt to construct piers on artificial islets in the middle of the Channel, by carrying his bridge across nine piers of cast iron of unusual dimensions, the bases of which are to be put together and bolted on the shore, and floated to the positions they are intended to occupy by means of large sheet-iron buoys, one of which, situated directly in the centre of the structure, is to be acted upon by a powerful screw, by means of which the huge base can be gradually lowered until the screw pile feet, upon which it is to stand, touch the bottom or bed of the sea, which has been ascertained to consist of solid chalk, into which the pile-screws are then turned. This method of binding the pier firmly to the bottom also serves as a means of rectifying the levels if necessary. The soundings in line of the proposed bridge show a maximum depth of 157ft. The top of the base will be just above the level of the sea when the feet are screwed to the bottom, and upon this the upper portions are to be erected, above water, piece by piece, in the usual manner. Except the centre one, all the piers at their foundations measure 130 yards in width, and 87 in length, diminishing upwards, and forming at the summit a square of 66 yards on each side.

The centre pier will be half as large again as the others. In addition to their own weight, of 2,500 tons each, these piers have to support an arch, of 3,282 yards in length, weighing about 14,000 tons.

To guard against the destructive action of the sea-water, all the submerged parts and those likely to be affected will be covered with a solution of gutta-percha or some other covering suitable for their protection. Between the abutment on the shore and the first large pier, five temporary piers are placed at equal distances in six lengths, of 550 yards each. This done, there are stretched in parallel lines 31 wire cables, two metres (*i.e.*, two yards six inches) apart. They are connected and bound together by ties made of smaller cables which interlace the large ones, and hold each in its place. The whole forms a tress of 63 yards wide. The tress thus made is covered by a wooden flooring, a guard is fixed on each side, and there is at once obtained a service bridge, upon which scaffolding is erected to support the beams of the bridge during their construction, the scaffolding being always of a sufficient height above the sea to allow the largest vessels to pass under it. The beam or tress of the bridge itself (in which the originality of the project mainly consists) is composed of a series of 120 cables of iron wire two inches in diameter, of which the number gradually diminishes to the middle, where there are but 30 stretched horizontally along the line of the bridge, at a distance of 20 inches, one above the other, connected every 22 yards, first by perpendicular cables fixed vertically, and then by strong iron transoms, also placed vertically. Each tress seen laterally presents the appearance of a vast net, the rectangular meshes of which are 20 inches square. Upon the vertical transoms rise small metal arches intended to support the planking or roadway of the bridge. Thus, M. Boutet obtains thorough rigidity, making in the meshes of the tress a complete weft. The interlacing the longitudinal cables by others less bulky, woven in the form of a lozenge, and the use of vertical transoms, augment the rigidity of each, and consequently that of the beam itself. On the other hand, this divides infinitesimally the effect of weight upon it, and weakens, to a certain extent, its effect before the lower parts of the beam are bent under the influence of a passing pressure. Five tresses of this sort, each 3,282 yards in length, fixed at a distance of 11 yards apart transversely to the bridge, are under-propped strongly against each other, and constitute together the body of the work. The width of the roadway is thus brought to 57 yards. At the piers the longitudinal tresses measure 66 yards in height, but 17 yards only in the middle of the length, without reckoning the height of the parapet, which would be 14 feet. The beams thus have the form of an elliptical arch of 3,282 yards in span; but, to augment the stability of the work, the author raises the central point of each tress by giving an inclination of 6 in 1,000 to the two sides. The beams or open tresses of M. Boutet are stated to offer a considerable resistance, possess a perfect rigidity, and are of very light weight as compared with their enormous length and bearing power. It is stated that they are estimated to support 24 trains fully loaded, meeting together in the middle between any two piers, and that the weight of the erection is 36 times greater than the maximum force of tempestuous winds, which would therefore be powerless to shake its ponderous mass.

M. Boutet estimates the cost of the undertaking at less than eight millions sterling, and expects that it would be finished in three years. A company has been formed in France (half the capital of which is being subscribed in England) for the purpose of promoting this great international undertaking.

MANUFACTURE OF COMPRESSED FUEL.

Mr. Warington W. Smyth, F.R.S., in his Paris Exhibition report "On Apparatus and Processes of the Art of Mining and Metallurgy," writes as follows:—

Within the last few years careful experiments, conducted by the administration, have proved, what was long doubted, that France possesses coals excellently adapted for sea service; and for some time past no other than French coal has been used in the Imperial navy. But for these purposes the fossil fuels from different localities have to be judiciously selected and mingled in certain proportions. Taking the coal as a whole, it is noticeable that it makes much more small and dust than our own, and is more frequently apt to be "dirty" or mixed with shale and clay. It hence results that the French coalmasters have been driven to pay a special attention to methods of cleaning their produce and utilizing the "slack," *menu*, or small coal. At the Great Exhibition, in 1851, Bérard's coal-washing machine came before us as a novelty, although it was only in certain details that it could rightly be so considered; and, besides several contrivances for that purpose introduced more recently, a great variety of ingenious apparatus has been brought into use for making "patent fuel," *agglomérés*—i.e., for pressing the small coal into cakes of various form by the aid of a small amount of some binding material. These *brquettes* are highly reported upon for naval use; in their carriage to the ports there is a loss of only 1 per cent. against from 6 to 10 per cent. on lump coal; and when stored abroad they are found after two years' exposure scarcely at all injured, whilst ordinary coal would have suffered to the extent of 50 per cent. Moreover, they are very free from ash, and may be made of a mixture of flaming and of dry coal, or of those varieties which have a more free-burning and a more calorific property respectively, in such a ratio as to give the best effect in getting up and maintaining steam. The present Exposition abounds with examples of the machinery and the products of this manufacture; and, although we are not in Great Britain without a similar industry, attention may fairly be called to the subject in the interest of the millions of tons of small coal and of inferior qualities which we are every year actually getting rid of as refuse.

As early as 1833 Messrs. Marsais and Ferrand took out a patent for this purpose, but it was not until 1843 that the agglomerated coal began to be produced in any quantity, and some years more elapsed before the machinery was so far improved by several different engineers as to lead to the present large scale of the manufacture. The St. Etienne Company exhibit a model of their apparatus as employed at Givors, where, by introducing an enormous hydraulic pressure, they need only to add $5\frac{1}{2}$ per cent. of pitch (*brai sec*) to solidify the mass. The stack of rectangular blocks left outside the St. Etienne shed in the "park" throughout the heavy rains of April gave good testimony to the thorough compactness and durability which had been thus attained.

The greater part of the French makers appear to have adopted the circular arrangement of the Messrs. Revollier, and of Mr. Evrard and M. Dehaynin. A beautifully finished model is exhibited by the company of La Chazotte (M. Max Evrard, engineer), having 16 cylinders disposed as the radii of a circle, in which the slack, after being heated by a current of steam and mingled by very ingenious apparatus with the pitch, is pressed by pistons and formed either into cylindrical or hexagonal blocks of convenient length. The rate of production appears to be in practice 10 tons per hour with one machine (of which La Chazotte works four), requiring an engine of 50-horse power to work it, and the extreme limit of pressure being 100 atmospheres.

The prices of the St. Etienne compressed fuel are high; the first quality, which contains only 2·10 per cent. of ash, is marked at 28*f.* per ton; the second, with 5 per cent., at 26*f.*; whilst the best block coal rules at from 19*f.* to 23*f.*, and the small at 9*f.* to 15*f.* The very small proportion of gas tar or pitchy matter introduced into the mass at this work can scarcely be considered as a general good, since different qualities

of coal will need some more and some less of binding material.

M. Felix Dehaynin, a producer of no less than 175,000 tons of *agglomérés* in the year, exhibits (in class 40) drawings of the Evrard machine as modified by himself and employed at his three works, in which 500 people are engaged. The company called the "Océan," at Paris, are also exhibitors of drawings and of the apparatus for the same purpose known by the name of its inventor, M. Mazeline.

As an adjunct in these operations, an ingenious machine by Hanrez and Co. (Belgium, 12) may be noticed. It is constructed for the drying of small washed coal by the revolution of a screw within a revolving perforated cylinder, and is stated to dry five tons per hour.

We could wish that coalworkers, mineral landowners, and capitalists would note these various indications of what is now becoming in France an important trade. Without being unmindful that several companies have been established in South Wales and elsewhere for a similar manufacture, we cannot but be conscious that their action is but an infinitesimal set-off against the wholesale waste of slack that takes place in this country. It is not only that the small coal cut and broken from the saleable part of seams is in most of our districts thrown into goaf and gob by the tens of thousands of tons, but those portions of beds, often some feet in thickness, which are intermixed with stone or "sulphur," or which make a larger than usual proportion of slack, are at once rejected as useless, and acres of such coal are abandoned to be inextricably mixed up with broken roof and heaving floor, although of no worse quality than would be turned to advantage in many a French colliery. It is impossible, in the hard competition of the times, to blame individuals for this sin against the economical use of Nature's gifts; but it is a discredit to the country at large, and will, among our descendants, entail many an anathema on the selfish stupidity of their forefathers.

POISONOUS MUSHROOMS.

The following is extracted from the *Lancet* :—

"It is to be hoped that the ardent fungologists who are seeking to popularise the mushroom tribe as an article of food will do their utmost to spread as widely as possible a knowledge how to discriminate between those species that are safely edible and those that are poisonous; otherwise, we may anticipate a great many mistakes with very serious results. An inquest has lately been held in South London, on the body of a waterman who ate mushrooms at Gravesend, returned to his home in town the same evening, in apparently good health, but before the next night died, with all the symptoms of mushroom poisoning. The verdict of the jury on the medical evidence was, that the death resulted from eating poisonous mushrooms. Botanical distinctions of the species are not as yet familiar to a very large proportion of the population, and it is as well that it should be known, as regards the mushroom family, that it contains some species which, however 'pleasant to the eyes' of a fungologist, are certainly not 'good for food.'"

Upon this subject Mr. Christopher Cooke writes to the editor of the *Journal of the Society of Arts* as follows :—

"According to the Registrar-General's last report, 'a lighterman, aged 28 years, died on the 25th of October, at No. 7, Devonshire-street, Newington,' having been 'poisoned by eating mushrooms,' according to the verdict of the jury, at the coroner's inquest, in London. Such fatal cases frequently occur, not by eating real mushrooms, but spurious specimens. It becomes, therefore, a serious and important question whether the real can be distinguished from the spurious, or poisonous, specimens of mushroom without chemical assistance. During my recent visit to the Orkneys and Shetlands, I gathered mushrooms real and fictitious, but the test of

their quality seemed to vary without any fixed rule for the opinion; at Stromness only the round, ball-shaped, specimens were rejected by the cook at the inn. At Kirkwall all specimens were accepted, although, certainly, some appeared dubious with respect to colour, form, and smell. At Lerwick, the colour was taken as the test of some fine specimens; one as large as a saucer, which I had picked out of Noss Isle. The colour was dark-chocolate, and the smell was fresh and pleasant. But, at Pierowall, in Westray Isle, out of a large collection of specimens, similarly coloured, only a few of the smaller kind were admitted by the niece of the keeper of the hotel, who declined to venture an opinion for herself, but deemed the whole to be worthless! The reason alleged for partial rejection in this instance was, that the specimens, although genuine, were chiefly old, and therefore poisonous. In the Isle of Lewis, I could not find any mushrooms. In your *Journal*, vol. xvi., pp. 467—471, Mr. Berkeley gave much useful information about fungi. At p. 517, Mr. John Bell recommended that a piece of the specimen should be tasted, as 'pungency, like pepper, not like cress,' shows unwholesomeness. As few persons understand the nature of fungi, this test is valuable, if reliable. In 'White's Selborne,' by Capt. Brown, R.N., it was stated that 'pixie stools,' or fairy rings in the green turf circles, where real mushrooms abound, in the southern counties, are caused by the guano of starlings. Mr. Smith's 'Charts of Fungi' (see vol. xvi., *ante*, p. 529), are admirable, but some practical tests are yet required, and Mr. Bell seems to have discovered one of general utility. In my cases no evil result occurred, but at Pierowall my companions advised me to reject all the specimens, as the colour, they thought, should be light-pink, and not chocolate, according to their experience in Shetland, to ensure safety."

CHARLIER'S SYSTEM OF SHOEING HORSES.

Captain Cockerell, in his report on this system, as shown in the Paris Exhibition, says:—

"Before entering into a description of this method of shoeing, it is necessary to understand the grounds upon which M. Charlier bases his theory. They are as follow:—

"A horse in its natural state is unshod. Placed by man to perform unnatural work upon artificial roads, it becomes necessary, in order to prevent the hoof from being injured, to protect his feet with shoes. The object, however, of all shoeing, is to interfere as little as possible with the action of the horse. How, then, has the old system succeeded in this respect? M. Charlier at once answers that it has not succeeded at all; one third of the horses one meets are lame, and three-quarters of these are lame with diseases of the feet, arising from bad shoeing. What, then, is the old system? 'It is a plate of metal, always too large, placed below the horse's foot—a sort of hard sole, inflexible, heavy, and polished by use—resting at the same time on the crust or wall of the foot, and on the sole, which is pared down so as never to touch the ground or receive any of the horse's weight upon it.' This, M. Charlier says, must be all wrong.

"1st. Why should the sole of the foot and frog not come upon the ground? Nature seems to have meant it to do so, and for this purpose has armed the former with strong and constantly-renewed horn, which modern farriers carefully remove.

"2nd. Does this heavy, hard iron shoe really protect the foot against the shock that takes place every time the latter comes to the ground? On the contrary, the hard metal plate, coming in contact with the hard road, sends into the foot a concussion, which, incessantly repeated, produces the most disastrous consequences.

"3rd. Is it right to make a horse carry a dead weight of iron on his foot double what is necessary? Must this not cause great and unnecessary expenditure of strength,

and produce an immense amount of fatigue; in short, causing a great waste of power.

"4th. The want of elasticity of the present shoe must be bad. It compresses the foot, impedes the circulation, and, by this, prevents the hoof from receiving its proper amount of nourishment, thereby drying it up, and producing numberless diseases, by bringing it into an unhealthy state.

"Moved by these and similar arguments, M. Charlier resolved in his own mind that the old method of shoeing was faulty in the extreme, and he determined to study how best these defects might be remedied.

"The following is the plan that he at last decided upon, with what success I shall hereafter show:—Taking an instrument something like a square gouge, with a guide to prevent its cutting beyond the required depth, the farrier scoops a rectangular groove from the outer circle of the horse's foot. Into this groove is fitted an iron band, measuring rather more than the thickness of an ordinary horseshoe, with only half its width; this is secured with from five to seven nails. The shoe being thus sunk, the sole of the foot, which is never pared, and the frog are brought on the ground. The shock of the constant concussion of the iron shoe on the hard road is thrown into the wall of the foot, and not into the softer parts of the foot, which are protected by the tough and elastic horn of the sole; the frog being also brought on the ground allows the animal to feel, and, as it were, to grasp the earth in slippery places. The shoe, being narrow, has a certain amount of elasticity about it, and, after a few days' use, adapts itself to the natural shape of the foot, expanding with its movement, and developing the frog, bringing the whole foot into action; so much is this the case, that, after three or four months, the foot is frequently found to have entirely altered its shape.

"And here I should allude to another improvement of M. Charlier's. The holes into which the nails are driven are made oval instead of square, consequently the rectangular nails driven into them take their shape, and by this means acquire a firmness of hold which is very advantageous. As was natural on the first introduction of a new idea, M. Charlier met with the most vigorous opposition, and some of the more prominent arguments used against him were as follow:—

"Having first been told that there was nothing new in his plan, that it had been tried and had failed years ago, other objections were brought forward. It was urged that, having removed the iron from the sole of the foot, the latter remained wholly unprotected from sharp stones and rough ground. This M. Charlier refutes. The horn having been allowed to grow, becomes hard and thick, and well able to resist a sharp stone or any such substance; added to which, the shoe being imbedded in the hoof, no small stones or dirt can lodge between the foot and the shoe. Again, it is said, that the groove cut for the insertion of the iron must be so deep as to injure the sensitive parts of the foot. This is denied. At first a light shoe is used, and the groove is not deep. Eventually, as the foot strengthens and grows, a deeper iron can be used if necessary; but besides this, no sensitiveness exists in this part of the foot, and consequently there is no such danger to be apprehended if decent care is taken at first. And here I may state that M. Charlier's latest experiments lead him to think that when a horse is first shod the shoe should descend a trifle (about the eighth of an inch) below the foot to allow for wear. It is hardly necessary to observe that the shoes should vary in thickness and weight, according to the size of the foot to which they are to be applied.

"Another objection advanced is the difficulty, in the event of a horse losing a shoe at a distance from home, of having it replaced. Of course, on the general introduction of this system, this objection would disappear naturally. Meantime, we find that the thickness of the sole which has been allowed to grow is so great that an ordinary shoe can be fixed for the moment, and that on return home this can be easily again replaced by the

Charlier shoe; and I have M. Languet's authority for saying that he has never had an instance of a horse in which this could not be done."

Captain Cockerell then gives the opinions of some veterinary surgeons and horse proprietors on the above system, who generally expressed themselves as satisfied with it. "In conclusion," he says, "I would suggest that a system so highly approved of by the jury, and now so largely used in Paris, would be worth a trial in England. Any method by which we can preserve our horses from lameness, or cause them to work a year or two longer for us, is a benevolent economy which it behoves us well to try, to say nothing of the duty we owe to our most valuable and useful servant, the horse."

TECHNICAL EDUCATION.—KNOWLEDGE OF FORESTRY.

Dr. Hooker, F.R.S., in his Paris Exhibition report "On Seeds and Saplings of Forest Trees," thus refers to the above subject:—

"Forestry, a subject so utterly neglected in this country that we are forced to send all candidates for forest appointments in India to France or Germany for instruction, both in theory and practice, holds on the Continent an honourable, and even a distinguished place amongst the branches of a liberal education. In the estimation of an average Briton, forests are of infinitely less importance than the game they shelter, and it is not long since the wanton destruction of a fine young tree was considered a venial offence compared with the snaring of a pheasant or rabbit. Wherever the English rule extends, with the single exception of India, the same apathy, or at least inaction, prevails. In South Africa, according to the colonial botanist's reports, millions of acres have been made desert, and more are being made desert annually, through the destruction of the indigenous forests; in Demerara the useful timber trees have all been removed from accessible regions, and no care or thought given to planting others; from Trinidad we have the same story; in New Zealand there is not now a good Kandi pine to be found near the coast; and I believe that the annals of almost every English colony would repeat the tale of wilful wanton waste and improvidence.

"On the other hand, in France, Prussia, Switzerland, Austria, and Russia, the forests and waste lands are the subjects of devoted attention on the part of the Government, and colleges, provided with a complete staff of accomplished professors, train youths of good birth and education to the duties of state foresters. Nor, in the case of France, is this law confined to the mother country; the Algerian forests are worked with scrupulous solicitude, and the collection of vegetable produce from the French colonies of New Caledonia, &c., contain specimens which, though not falling technically under Class 87, abound in evidence of their forest products being all diligently explored."

Fine Arts.

DECORATION OF THE NEW ASSIZE COURTS OF PARIS.—The encouragement given to artists of all classes by the Government and the City of Paris becomes more remarkable every day; no opportunity seems to be lost of furnishing employment for the pencil and the chisel. Two new courts of assize have been erected on that side of the prefecture of police which faces the quaint old Place Dauphine; the northern court has a handsome ceiling of panelled oak decorated with gold, and over the seats of the judges are the following paintings:—Justice protecting Innocence, and terrifying a culprit. The lower part of the walls are covered with oak panelling, and the upper portions with tapestries painted on canvass, and decorated with eagles and other imperial

emblems. The ornamentation of the other court is of a similar character. The entrance to these courts is from a large vestibule, in which are placed magnificent bronze candelabra; the doors of this fine hall are also of bronze. The whole of the decorations have been executed under the direction of the architects, MM. Duc and Daumet. The painters employed are MM. Lehmann, member of the Institute, Bonnat, Richomme, Lefebvre, Ulmann, and Jobbé-Duval; sculptors, MM. Duret, Dumont, Jaley, Lemaire, Jouffroy, Perraud, all members of the Institute, Gumery, Chapu, Oliva, and Lequien. M. Denuelle has executed the decorative painting, and M. Hayon the sculptural ornamentation.

EXHIBITION OF A NEW FOUNTAIN.—A very laudable practice exists in Paris of exhibiting there in public any important work of art intended for the provinces. At the present moment may be seen, in the space between the Pont des Arts and the entrance of the Louvre, a colossal group in bronze of the "Three Graces supporting urns." This group, composed and modelled by M. Gumery, and cast by M. V. Thiebaut, is for a monumental fountain to be erected on the Place de la Bourse of Bordeaux. The fountain when complete will consist of a large basin, in the fine yellow-veined stone of the Jura, on a basement of the same material, decorated on three faces with children seated on dolphins. In the centre of the great basin will be a bold socle of the same stone supporting an upper basin, in which stand the figures in question. The general design is somewhat similar to that of the beautiful fountain of the Place Louvois, in the Rue Richelieu, on the site of the old Opera House, where the Duc de Berri was assassinated.

COMPLETION OF THE REPAIRATION OF THE CATHEDRAL OF NOTRE DAME.—The repairs and redecorating of Notre Dame, which have occupied thirty years, may now be said to be completed. The workshops and sheds which have so long disfigured the environs of the noble building are being rapidly demolished and cleared away, and the church is being surrounded with handsome wrought-iron railings in harmony with the style of the architecture. The cathedral is now open to the east and west; its southern side faces the narrow arm of the Seine, and is well seen from the opposite quay. The old hospital of the Hôtel Dieu, which abuts on the southwestern corner of the edifice, will be removed when the new hospital is ready, about the end of next year, and there will then be nothing to obstruct the view of the cathedral except the houses in the street on the north side, which will probably not be long allowed to mar the effect of this fine example of the architecture of the middle ages.

Manufactures.

SUGAR MANUFACTURE.—The *Produce Markets Review* says:—"It is evident that perfection in sugar-making has not yet been reached, but to those who are still contented with the processes invented by their great grandfathers, it will perhaps be a matter for surprise that no less than 46 patents connected with sugar manufacture have already been registered in France this year. The beet is thus still receiving the closest attention, and being developed with all the strength that capital and science combined can give. Can the British West Indians say the same of their cane, or is it not dropping more helplessly in arrear year by year? They may certainly learn a lesson from the French colonists, who sent no less than 13,000 tons of fine white crystals assimilated to refined last year. While remarking on the greater desire for improvement shown by the French, we have received Messrs. Arnold Baruchson and Co.'s last circular, which sets forward in a striking way the care which must be bestowed on manufacture in France, and also mentions the startling fact that a fourth of the whole crop was turned out in the shape of fine white crystals. Speaking of the new plan of buying by analysis and saccharine rich-

ness, those gentlemen say:—"As on this system it is to the manufacturer's advantage to produce as pure sugar as possible, the deliveries to a great extent have consisted of beautiful crystallised qualities, unsurpassed, if equalled, by the best descriptions of Havana and Mauritius. Such qualities command, however, a very high price, analysing as high as 97 to 98 per cent. pure sugar. The gradual progress of our beet sugar manufacture is manifested by the fact that not less than a quarter of the whole output last year, viz., 58,000 tons, has been pure white crystals, above No. 20 Dutch standard, without having first passed through the refiner's hands."

TECHNICAL EDUCATION.—THE MINING SCHOOL AT AOSTA.—The mining school at Aosta was established in 1865 for the purpose of educating persons intending to embrace the profession of superintendents and overseers of mines. The courses, which are gratuitous, are comprised in three years of study in the following subjects:—Mathematics, linear drawing, Italian literature, history and geography, chemistry, chemical analysis applied to mineral substances, geology, mineralogy, and metallurgy.

Commerce.

THE PRICES OF CLARET.—The Bordeaux journals publish details of the great sale of wine at Chateau Lafitte. When the estate belonging to the late Count Duchâtel was recently sold, the heirs reserved to themselves the right of selling the wine in the cellars and the furniture of the house. The former has now been disposed of without any preliminary tasting, the purchaser paying five per cent. additional as auction duty. The attendance was exceedingly large, and comprised the principal wine merchants, *gourmets* of France, proprietors of the great Paris restaurants, agents from many members of the aristocracy and finance of France and abroad, and several foreign dealers. The dates of the wine ranged from 1797 to 1864, and the competition was naturally great, such a collection never having before been offered for sale. The minimum price was 7*f.* the bottle for the growths of 1826 and 1863, and the highest, 121*f.*, for that of 1811, the year of the comet. "The extraordinary prices realised," says the *Produce Markets Review*, "are, of course, simply to be regarded as another example of the length to which connoisseurs in any article of taste will go to gratify their fancy. At the same time, although in exceptional cases like the present wine fanciers will continue to give excessive prices, there can be no doubt that the days of very high-priced wine, so far as England is concerned, are past, and that the real way to increase the trade to anything like its proper limit is to reduce, and not to raise, cost. It is therefore with regret that we have heard of the heavy speculative operations in 1868 wines at Bordeaux. It is no doubt true that the quality will be very fine, and, on the other hand, that the crop will not be nearly so large as was at one time expected; but if price and not quality is to govern the demand here, we can only look with regret upon the probability of an established advance in Bordeaux wine. The English demand is probably too small to have much appreciable influence on the market, and if any considerable advance took place, the tendency would of course be to divert our consumption to other markets. Claret sellers must not flatter themselves with the idea that the continually increasing class of consumers, who are principally reached by the grocers, have any special fondness for their wine over that of other growths. Nor must they lay too much stress upon the inferior preparation of the wines most recently introduced, for the growers will no doubt be prepared to take whatever steps may be necessary to suit the English taste."

CONSUMPTION OF FOOD AT FLORENCE.—Since the removal of the capital from Turin to Florence in 1865, a great increase has taken place in the consumption of food, as will be seen in the following comparison between that

of 1864 and 1867:—The number of head of bullocks slaughtered during the year has increased from 12,526 in 1864 to 19,724 in 1867; sheep, from 89,521 to 138,324; fresh meat, from 209,452 kilogrammes to 514,909 kilogrammes; the head and inferior portions, from 147,703 kilogrammes to 267,734 kilogrammes; salt meat, from 52,403 kilogrammes to 180,083 kilogrammes; bread and flour, from 16,164,376 kilogrammes to 19,595,859 kilogrammes; wine and vinegar in barrels, from 137,921 hectolitres to 208,597 hectolitres; bottled wine, from 21,411 to 83,017 bottles; sugar, from 490,033 kilogrammes to 1,000,170 kilogrammes; coffee, from 175,692 kilogrammes to 439,512 kilogrammes. The octroi duties have increased from 2,417,826 *frs.* 25 centimes to 5,200,675 *frs.* 30 centimes. The total number of shops for the sale of provisions is 4,353, of which 3,463 are in the town, and 890 in the suburbs. Of these, 597 are for the sale of wine, 298 pork butchers, 247 bakers, 215 restaurants, 184 grocers, 188 small eating-houses, 178 cafés, and 134 cook-shops. In Florence there are 11 public baths, 6 of which are on the river Arno, 502 cabs, 80 omnibuses, and 450 porters.

THE AGRICULTURAL PRODUCE OF CALIFORNIA.—The following is from a report of Mr. Consul W. L. Brooker, on the Trade and Commerce of San Francisco:—"The area of land in this state is about 100,000,000 acres, and it has been estimated that over one-third is adapted to agriculture; this estimate is undoubtedly a sanguine one, but the capacity of the state for the growth of cereals is enormous, and vast quantities of hilly and swamp land, favourably situated, not at present tilled, will be made use of when the more desirable lands are occupied. The past year the total area of land under cultivation did not exceed 1,850,000 acres, and with a harvest below the average, we had for export 1,000,000 quarters of wheat; it is easy to see from this what a future the state has before her, with an increased population and railway communications, as a furnisher of grain to other countries; the distance from England and France, though great, is of little consequence, the grain grown here being harvested in such dry condition as to bear the voyage of from four to five months without any deterioration in quality. The absence of rain in the summer months enables the farmers to thrash in the field and thus save much labour; the dryness of the grain when harvested causes a good deal to be shed, but it is frequently made use of by being left to grow as a 'volunteer' crop the following year, and it is not unusual for this second crop to yield fifty per cent. of the original. Wheat has been found the past two years to pay better than other grain, and the quantity of oats and barley sown has not increased materially in consequence. One serious thing in connection with farming is, that no attention is paid to rotation of crops; wheat follows wheat, or barley barley, without a thought being given to the inevitable exhaustion of the soil sooner or later; however, many assert that the land does not deteriorate by the system, that without the aid of guano or manure of any kind, they have grown grain for nine or ten consecutive years without any diminution of the crop. The grape vine is cultivated in all parts of the state, and although the manufacture of wine has not proved lucrative, it is estimated that the quantity will approximate to 2,000,000 gallons, a good deal of which has, however, been distilled into brandy, which is found to pay better, even with the present excise duty of 1 dollar per gallon. Fruits of almost every known variety grow luxuriantly, apples and pears are in plentiful supply throughout the year; during the past season 180,000 boxes, averaging 40 lbs. each, of peaches were sent to this market; cherries, strawberries, plums, quinces, raspberries, figs, gooseberries, and currants, were plentiful for several weeks. From the southern part of the state were received large supplies of oranges, lemons, quinces, olives, and walnuts. Apples, pears, peaches, plums, and figs are dried in considerable quantities, and we shall be able in two or three years to supply other markets. The shipments of grain

and flour during the year 1867, to all points, were as follows:—Wheat, 940,742 quarters; oats, 3,205 quarters; barley, 17,409 quarters; flour, 523,793 barrels.

THE AMERICAN FLOWER TRADE.—The trade in flowers in the United States during the last few years has received a great development, and amounts annually to millions of dollars. Twenty years since there was only one florist in the whole length of Broadway. Now numerous shops, all well filled and well frequented, may be found there. One of them, managed by Mr. Henderson, does annually an enormous amount of business. The florists are generally supplied by the nurserymen of Philadelphia, Baltimore, and even Cincinnati, who are almost all of German or English extraction. The most favourable time for the sale of flowers begins in September, and ends at Easter. Christmas-day, New Year's-day, and Easter-day are the three principal days for sale; at each of these seasons the churches are literally strewed with flowers. All the year besides, in public or private ceremonies, at funerals, at political or religious meetings, an immense consumption of plants and shrubs takes place.

THE GAS SUPPLY OF MILAN.—The following particulars relating to the gas lighting of Milan are given by *Il Gas*, a monthly journal, just published at Milan. In 1787 this city was first lighted up, 1,158 oil lamps being used for this purpose. On the 31st July, 1845, Milan was first lighted with gas. The streets were lighted with 377 gas lamps, and 800 of the old oil lamps; in all with 1,177 lamps. The price paid for gas was 38 centimes per cubic metre for the public lighting, and 66 centimes by private consumers. In 1851, the number of gas-lamps was increased to 494, and the price per cubic metre reduced to 35 centimes for public lighting, and 50 to private consumers. The total quantity of gas consumed per annum by the street lamps was 210,295 cubic metres, and the annual expense for the lighting the city amounted to 211,913 francs (including the 770 oil lamps which were still used in some of the streets). The number of private burners was 2,608, which consumed 620,800 cubic metres of gas per annum. From 1851 to 1863, the number of lights, both public and private, was greatly increased; and in 1864 a fresh contract was made with the municipality at 28 centimes per cubic metre, and with private consumers at 45 centimes. The following is the number of lights both public and private, the annual consumption of gas, and expenditure for lighting of Milan from 1864 to 1867:—

	1864.	1866.	1867.
Public Lighting:—			
No. of street lamps	1,764	2,469	3,082
Consumption of gas, cubic metres	761,306	1,061,154	1,195,638
Annual expenditure, francs	305,394	295,681	314,227
Private Lighting:—			
No. of burners	20,491	26,127	30,097
Consumption of gas, cubic metres	1,874,211	2,412,350	2,721,896

The illuminating standard, according to contract between the gas company and the municipality, is, that each lamp should consume not less than 120 litres of gas per hour to equal 42 grains of Colza oil, burnt in a Carcel lamp.

THE TRADE OF ODESSA.*—The following report on this subject is by Mr. Othon Trithen, Swiss Consul at Odessa:—Industrial enterprise, which had to struggle a long time before it got a firm footing in this country, begins to spread and prosper, although the year 1867

was not one of the most favourable, especially as regards sugar refineries, prices having undergone a decline in consequence of an abundant crop of beetroot. Steam flour mills have likewise given results inferior to those obtained hitherto in consequence of the dearness of corn, which prevented shipment of flour to Turkey at suitable prices. Steam saw mills prosper and multiply, as well as distilleries and breweries. In one word, we see all the industrial enterprises undertaken by experienced persons, and who have capital corresponding with the importance of the establishment, succeed and prosper, whilst the contrary effect is produced where the above conditions essential for success were wanting, which only confirms my conviction that industry can exist in South Russia, provided the management is based on experience and good sense. Agriculture has not lost its importance since the emancipation of serfs, as one would have apprehended; and although I am in want of statistics wherewith to establish how much labour was devoted to the soil ten years ago, viz., before the emancipation, and how much labour is employed now, I am convinced that the difference in excess is considerable. The culture of Merino sheep continues to develop itself in a satisfactory manner, although it is difficult to contend against the opposition of Australian and Cape wools. In 1867 import business increased greatly, and the following articles, especially, show a considerable increase on the preceding years:—

Importations.	1866.	1867.
	Poods.	Poods.
Tea	15,469	23,062
Coffee	43,527	70,422
Oil	90,758	146,675
Tobacco	36,521	40,586
Cotton and cotton stuffs	10,068	18,921
Dye-wood	8,145	20,960
Iron	846,368	3,395,666
Coals	4,719,671	7,440,137
(63 poods = 1 ton.)		

The increase on the latter articles is too considerable not to merit special remark. The increase of iron results from the enormous quantities of rails which have been imported for the various lines of railways now being formed, and the increase of coals is due to the activity which is always extending in sea and river navigations, railways, and industrial establishments. The exports in 1867 present, likewise, a very considerable increase over those in 1866—say nearly six millions of roubles—the increase would have been still more considerable if there had not been a decrease in the following articles:—

Exports.	1866.	1867.
	Chetwerts.	Chetwerts.
Flour	116,084	85,359
Oats and barley	342,128	51,563
	Poods.	Poods.
Soap	473,555	211,362
Wool	336,556	248,015
Horses and other cattle	374,515	nil.
(100 chetwerts = 72 quarters.) (63 poods = 1 ton.)		

The construction of railways in South Russia is pursued with the greatest activity, and we shall probably see, in the current year (1868), the lines from Odessa to Elizabetgrad, and from Odessa to Keef, completed; and the works continued on one side to Kremenchong, and on the other to the Austrian frontier at Nolothesk, where they will join the Brody-Lemberg line. It is to be regretted that the rolling stock and material employed are quite insufficient to the wants of commerce and the public. The rate of interest and of discount for good

* This document was kindly forwarded to the editor by Mr. John Draper, of London-wall, a member of the Society.

bills was, through the year, 10 per cent., or thereabouts. The total exports of Odessa, in 1866, amounted to £6,818,377, while the imports were estimated at £804,061.

THE ELECTRIC LIGHT ON THE ITALIAN COAST.—The new light-house at Brindisi will be lighted up by an electric lamp apparatus. This will be the first application of electricity for the illumination of light-houses in Italy.

Colonies.

THE CAPE OF GOOD HOPE.—Attention is now being devoted in the eastern provinces to the further development of the capabilities and resources of the colony. The mimosa silk is being tested; the *Ailanthus glandulosa*, if not the worm which feeds upon it, has been grown. A gentleman has just obtained some valuable seeds from Egypt, to which he will secure as favourable a trial as he can. Lucerne is taking a place as food for cattle, and as a substitute for more fickle crops. Experiments are being made in methods of agriculture with new implements, and by the economising and application of manures hitherto neglected. Much is being done in the important department of water storage. Ostrich farming and the angora are recent enterprises. The first bale of cotton has been sent from the eastern province. It was grown in the Peddie district, and is apparently of good staple. Tobacco, pronounced to be equal to the best American, has been produced; some of the leaves measure two feet ten inches. Mr. Inspector Bowker, of the Mounted Police, has prepared a sample of wax, the produce of the mimosa tree. The material from which it is made is supposed to be formed by a kind of ant or insect. It consists of a whitish substance, which abounds on the thorn trees near Maclean, in British Kaffraria, and when melted down forms wax which is not much unlike dark beeswax, though of a different smell. Two plants are reported as growing wild in the Chalumna. One of these is supposed to be the genuine sarsaparilla root, which it strongly resembles, and the other apparently a tea plant of the China species. The latter plant is said to be plentiful, and very luxuriant.

AUSTRALIAN WINES.—An attempt is being made to get up a public company in Melbourne, for the purpose of purchasing Australian wines; storing them till matured, and ultimately introducing them into the European and Indian markets in a manner that will secure for them a proper reception. Properly carried out, such a project would certainly prove highly useful, not only to Victoria, but also to the neighbouring colonies. In this colony alone there are, as appears from the lately-published agricultural returns, 4,176 acres under grape vines, while in New South Wales there are 2,281, and in South Australia, 6,361 acres, or 12,818 acres in all. A considerable portion of this large area is no doubt under vines not yet arrived at full bearing; but on the other hand new lands are planted with grape vines every year, so that the wine production of the three colonies is certain to attain to large dimensions within a few years. Even if there should be no extension of the wine trade beyond the natural extension that will result from the growth of the vines already planted, we might count upon having something like 5,000,000 gallons of wine produced in the three colonies within a year or two. For this we can scarcely expect to find local demand at prices that will remunerate the vigneron. The taste for colonial wine is unquestionably growing rapidly in Victoria. Indeed, in Melbourne alone there is already a very large consumption, nearly forty wine shops being kept open, in which nothing but colonial wine is supplied to the customers, while at private tables the Victorian wines are generally produced, and always partaken of to some extent when available.

THE VICTORIAN RAILWAYS.—The receipts of the current year show a total up to 6th August of £326,878 2s. 6d.,

against £313,333 during the corresponding portion of last year. The weekly average this year is £10,544 9s. 1d., against £10,107 10s. 7d. last year. The Melbourne Hobson's Bay Railway Company's receipts from July 1 to August 6, were £12,238 18s. 7d., against £13,242 19s. 2d. during the corresponding period of last year.

Publications Issued.

IL GAS is the title of a new publication, which, as its name implies, treats entirely of matters connected with gas lighting and manufacture. This journal is published monthly at Milan, and is the first periodical connected with this industry which has been brought out in Italy. The first number, which has just been published, contains a paper on "The Flow of Gas in Pipes, and its discharge from orifices," by an eminent gas engineer of Milan. The other articles are "The history of the lighting of Milan with Gas," "The use of Petroleum as fuel for steam boilers," besides other miscellaneous information. It also contains a share list and price current of coal, coke, and metals, and a list of freights from Newcastle to the principal Italian ports. The subscription to *Il Gas* is 12 francs per annum for England.

COLONY OF VICTORIA: PATENTS AND PATENTEEs, FROM 1854 TO 1866.—By William Henry Archer, Registrar-General of Victoria. (By authority, John Ferres, Government printer.)—It appears by the preface that the present volume is the first of a series of publications which, it is hoped, will prove of great utility to inventors, capitalists, practical manufacturers, and others. The plan of publication is based as much as possible upon that adopted by the British Commissioners of Patents. The work contains:—1. A list in which the various patents granted or applied for during the period from 1854 to 1866, both inclusive, are systematically classified and arranged in accordance with the nature of the invention; the claim of the patentee or peculiarity of the invention being also briefly given. 2. A list of patentees lexicographically arranged, with the titles and dates of their inventions for the above period. The whole is rendered still further easy of reference by means of a carefully compiled index or key of terms and phrases used in the titles. The present volume is to be followed, as soon as practicable, by the publication of abstracts of the specifications, illustrated by carefully prepared drawings.

Notes.

THE MONT CENIS TUNNEL.—During the second fortnight of the past month (October) the progress made at the Mont Cenis Tunnel was 62·40 metres; of which 28·30 metres were driven on the south side, at Bardonnèche, whilst the progress made at the north end, at Modane, was 34·10 metres. The position of these works up to the 31st October was as follows:—

	Metres.
Length driven at Bardonnèche	5,263·30
Length driven at Modane.....	3,694·75
Total length of tunnel driven	8,958·05
Length remaining to be driven	3,261·95
Total length of tunnel	12,220·00

CONSERVATOIRE DES ARTS-ET-MÉTIERs, PARIS.—The annual courses of lectures on science applied to the arts, which are open gratis to all the world, have just commenced at the Conservatoire des Arts-et-Métiers, in the Rue St. Martin. This excellent establishment is being largely increased and renovated; extensive new buildings in connection with the old edifices of the monastery of Saint Martin, or in the same style, are being erected, and will shortly be finished; and a number of miserable tenements which abutted on and partially hid the fine old

chapel of the monastery are being removed, so as to throw the whole open to view, and also to diminish the chance of accidents by fire. The new buildings will allow of great extension of the chemical and agricultural portion of the establishment, commenced after the great Exhibition of 1855, as well as of the older departments. One of the latter is perhaps not known abroad so well as it deserves to be, namely, the office of inventions and of mechanical and other plans and drawings, which contains a fine collection, open to the public twice a week, and at all times to those who desire to examine them with a serious aim. These documents date back to the time of the first empire, when the conservatoire was established.

THE PALAIS DE L'INDUSTRIE, PARIS.—The building which was erected for the Universal Exhibition of 1855, has been one of the most useful public edifices in Europe, besides affording shelter for the Salon or exhibition of the works of modern artists, which in consequence has become annual instead of biennial or triennial as formerly, while the number of works is almost, if not quite, doubled. There have been exhibitions of all kinds held there, agricultural and horticultural, exhibitions of horses and of insects, exhibitions of applied art and manufactures, archaeological, antiquarian, and photographic exhibitions, and exhibitions of poultry, cheese, butter, and dairy implements; in short, many exhibitions, nearly every one of them important, have been held which could scarcely have taken place but for the existence of this useful public building. In addition there is a permanent and gratis exhibition of colonial products established there, and the ceremonies connected with the Universal Exhibition found an admirable theatre in the Palais de l'Industrie last year. On the occasion of the horse exhibitions the central portion of the building was laid down with tan and used as a ride, and for the exhibition of cavalry training and driving, and this apparently has led to a new temporary application of it. Parisian horsemen, who increase in number every day, complained that they wanted a place of exercise in bad weather, and at the suggestion of the chief equerry of the Emperor, the Palais is to be devoted to that purpose during the winter months. The nave is separated into two parts, a general ride and a school, or place of equitation. They are to be open from seven in the morning till dusk every day, from the 15th November to the 15th March, with the exception of an hour and a-half to give rest to the attendants. The admission for each cavalier is to be half a franc in the morning and a franc in the afternoon, and the public is to be admitted to the surrounding galleries at the lower rate of admission all day. Monthly tickets will also be issued at ten and twenty francs.

THE SUEZ CANAL.—The following is the position of the works of excavation on the Suez Canal up to the 15th September:—

	Metres cube.
Total amount of excavation executed on canal up to 15th August	47,228,155
Total amount excavated from 15th August to 15th September	2,081,367
<hr/>	
Total amount executed up to 15th September	49,309,522
Amount remaining to be executed	24,802,608
<hr/>	
Total amount of excavation estimated for construction of canal	74,112,130

THE GENOA AND CHIAVARI RAILWAY.—The inauguration of the Genoa and Chiavari Railway took place on the 31st October, and the line was to be opened to the public on the 5th November. The length of this railway is 34 kilometres. Between Genoa and Chiavari there are not less than thirty-nine tunnels, the total length of which are 15 kilometres, or nearly half the entire length of the line. The longest tunnel is that of Ruta, which is 3,047·25 metres in length. The maximum gradient is 6 in 1,000.

Correspondence.

DIAMONDS AT THE CAPE COLONY.—SIR,—As the report of diamonds having been found at the Cape has excited considerable interest, and as it is possible that some unfortunate persons may thereby be induced to embark on a fruitless errand, I think it advisable to make public some facts with which I have become acquainted in connection with this subject. Some months ago my attention was called to the report of diamonds having been discovered in or near to the Orange river, and I was shown a diamond of fair quality (resembling the Indian rough material) said to have been found thereabouts. Being naturally desirous of discovering or developing a new source of supply to supplement the gradually decreasing yield of the Brazilian and Indian mines, I commissioned Mr. J. R. Gregory, a gentleman well known in geological and mineralogical circles, thoroughly to explore the districts where diamonds were said to have been found. Mr. Gregory has just returned, and reports having carefully visited the Orange, Vaal, Buffalo, and Fish rivers, as well as the adjacent country as far as 120 miles into Griqua Land, and has failed to find anywhere those geological and mineralogical signs which have hitherto been invariably seen wherever diamonds have been found, and nowhere does the formation of the country warrant the inference that diamonds could exist there. The whole of the territory visited is of volcanic origin; in only one instance, at George, on the extreme south coast, did Mr. Gregory meet with a stratum of granite and mica slate; this was coarse and friable, and contained only crystals of black tourmaline, which crumbled on being taken from the quartz. The "Conglomerate bed," alluded to by Professor Tennant at the British Association, described by him as consisting of sand with quartz pebbles, was in reality a composition of lime with agate and calcedony pebbles. The solitary specimens of rough diamond as yet produced have been brought to light through the instrumentality of a Dutch farmer, and two of these were said to have been found on separate farms of his, some twenty miles apart. Mr. Gregory, who is a perfectly competent authority, after exploring all the places said to be "diamondiferous," and over 2,000 miles of other Cape territory, is clearly of opinion that no diamonds have nor ever will be found in the Cape Colony—saving such as are there deposited for a purpose; and he fully believes that all the reports that have been so industriously circulated on this subject and about gold fields (of which more hereafter) owe their origin solely to interested parties, who aim at enhancing the price of land and attracting a flow of immigration. The degree of competency of the local geological and mineralogical authorities, is indicated by the fact of their having recommended digging to a depth of 120 feet through a bed of lignite of tertiary formation in the hope of finding true coal beneath, and this recommendation was actually carried into effect at Joostenberg, a place about forty miles from Cape Town. One of the Cape mineralogical luminaries, in one of his letters to the *Cape Argus*, describes emery as a compound of iron and quartz, though any "tyro" knows it to be simply impure corundum. With such guides to knowledge it is not surprising that inexperienced persons, and even government officials, have been deceived. For the information of the public, I may as well state that the diamond has hitherto been found only among rocks of the very earliest period, such as granite, mica slate, and other metamorphic rocks, and they are usually found accompanied by itakolumite, titaniferous iron-sands, oxides of tin, zircons, &c.; as yet there has been no single instance of their appearing in rocks of a volcanic origin. As regards the so-called "gold fields," Mr. Gregory, although unable to visit the district, is of opinion, from what he has seen and learnt, that they are as equally a myth as the "diamond mines;" and although gold may, and doubt-

less does, exist there, as it does indeed in most parts of the world, England included, yet it is not in sufficient quantities to pay to work, nor to warrant the name of "gold-fields," so pompously applied to them. Very slight dependence should be placed in the Cape newspapers' sensational paragraphs. As an instance of their reliability, Mr. Gregory relates that, while at Hope Town, an explorer came down from the "gold country" and exhibited a specimen of "gold-bearing quartz," which on examination proved to be quartz with gold-leaf artistically glued on, sufficiently well to deceive an unpractised eye. Mr. Gregory exposed the imposture in the presence of several witnesses, yet the very next number of the *Colesbury Advertiser* said that "the explorer in question had arrived from Bamangwato, and had brought down some specimens of gold, which Mr. Gregory, the mineralogist, had pronounced to be very rich." These so-termed "diamond and gold discoveries" have been extensively puffed, and unless the true facts are made apparent, I fear that many adventurous persons might be induced to risk their all in emigrating to a colony where everything is very dear and subsistence hardly to be earned; and I fancy they would derive small comfort in their ruin from the consideration that their emigrating might eventually lower the price of labour and thereby benefit the established colonists.

—I am, &c., HARRY EMANUEL.

8, Clarence-terrace, Regent's-park.

WHITE WHALE SKINS.—SIR,—I saw yesterday, on board the Aberdeen whaler *Kate*, Capt. Fraser, now unloading at Peterhead, a quantity of white whale skins, which he has brought as an experiment to this country. I believe it is the first time that they have been imported, and as they seem fitted to produce a tough and serviceable leather, it may be useful to some of your readers to have their attention directed to them. The *Kate* has brought home the oil of 250 white whales, and should their skins prove valuable, they will offer an additional source of profit to those engaged in this dangerous enterprise.—I am, &c., JOHN FRETWELL, jun.
38, Gresham-street, London, E.C., Nov. 10th, 1868.

MEETINGS FOR THE ENSUING WEEK.

- MON.....British Architects, 8.
Society of Engineers, 7½. Discussion on Mr. Henry Gore's paper on "Modern Gas Works, at Home and Abroad."
Entomological, 7.
TUES ...Civil Engineers, 8.
Anthropological, 8.
Statistical, 8. Professor Jevons, "On the Amount of the Metallic Currency of the United Kingdom with reference to the question of International Coinage."
WED ...Meteorological, 7.
R. Society of Literature, 8½.
THUR ...Linnaan, 8. 1. Mr. A. W. Bennett, "On the Structure and Affinities of *Parnassia palustris*." 2. Rev. M. J. Berkeley and Mr. C. Broome, "On some species of *Agaricus* from Ceylon." 3. Dr. Lindsay, "Experiments to determine the value of Chemical reaction as a specific character in Lichens."

Patents.

From Commissioners of Patents' Journal, November 6.

GRANTS OF PROVISIONAL PROTECTION.

Adhesive substances—3177—E. T. Hughes.
Axles, conveying rotary motion to—3229—K. J. Winslow.
Bath gloves, &c.—3215—T. Forster and J. Heartfield.
Beaming warps—3186—T. Wrigley and W. E. Yates.
Bedsteads—3121—J. Moon, I. H. Donaldson, and S. J. Harris.
Belts, &c., buckles for—3239—T. Walker.
Blinds, maps, &c., rollers of—3005—T. Fisher.
Buildings, warming and ventilating—3176—J. Phillips.
Button fastenings—3261—H. Mayhew.
Capstans—3251—B. Hunt.
Carriage axles, &c.—3188—J. Cockshoot, jun., and H. Weatherill.
Cartridges—3182—E. Ludlow.
Chandeliers, &c.—2316—F. Horner.
Chemical operations, utilising the vapours evolved during certain—3036—R. Heilmann and P. Hart.
Chinese fans—2717—J. Neumann.

Coal, &c., breaking down—3275—J. Jones and S. P. Bidder, jun.
Coffee-pots—3152—J. Denley.
Cooking apparatus—3184—F. P. Warren.
Cotton, cleaning and decorticating—3259—S. Clark.
Cotton seed, treating—3149—W. Lorberg.
Cotton, &c., cleaning, &c.—3018—F. A. Calvert.
Drilling apparatus—3142—W. R. Lake.
Dyeing hair—3138—W. R. Lake.
Engine or pump valves—3241—W. W. Tonkin.
Finger rings and bracelets—3172—J. Sherman.
Fire-arms, &c., breech-loading—3173—C. Churchill.
Flax, &c., breaking and peeling—3028—E. F. Rose.
Flour mills—3205—E. Harrison.
Food, preparing from the entrails of animals—3086—J. Dewar.
Furnaces—3156—E. Fort and J. Lea.
Furnaces—3166—T. Vicars, sen., T. Vicars, jun., and J. Smith.
Gun-boats—3134—R. Dawson.
Guns, breech-loading volley-firing—3164—W. R. Lake.
Heat and light, obtaining—3101—H. A. Archereau.
Heating and cooking apparatus—3124—S. Leoni.
Kilns for burning bricks, &c.—3231—J. Ryder.
Lace—3126—W. Brailsford and J. Gadsby.
Lamps—2349—J. A. Hogg, jun.
Lamps—3132—G. N. Sanders.
Looms—3095—J. Peel, J. F. Broadbent, and J. M. Baines.
Looms—3243—J. Gregson and W. Monk.
Looms—3277—T. Priestley and W. Deighton.
Minerals, &c., pulverising—3235—T. Carr.
Mowing machines, &c.—3225—H. Warner.
Ores, &c., preparing and dressing—3247—J. Bernard.
Paper collars, &c.—3253—C. W. Davis.
Picture frames, &c., ornaments for—3130—H. C. Clifton.
Projectiles—3223—H. C. E. Malet.
Rails, &c., securing the joints of—3128—T. F. Caslin.
Railway trains, facilitating the stopping of—3150—H. Hudson.
Railways, permanent way of—3168—E. M. Marchant.
Rotary engines—3271—J. Loader and W. H. Child.
Safety-lamps—3160—T. Gray.
Safety-valves—3174—J. Ashcroft.
Sewing machines—3263—J. L. Kieffer.
Ships, propelling and steering—3122—W. Moodie.
Steam gauges—3265—J. Silvester.
Stereotype plates—3136—J. Worster.
Stoves and boilers—3170—E. Head.
Surface printing, blocks for—3255—E. Wimbridge.
Tourists' bottles, &c.—3178—C. Mayer.
Tubes, metallic—3148—J. Atkins.
Valves made of india-rubber, &c.—2702—T. G. F. Dolby.
Walls, &c., ornamenting—3269—B. Nicoll.
Water-closets—3140—J. Shanks.
Wool, &c., combing—3219—I. Holden.
Wool, &c., spinning—3144—W. R. Lake.

PATENTS SEALED.

- | | |
|----------------------------------|------------------------|
| 1215. E. Dubois and E. Casper. | 1577. J. Driver. |
| 1498. R. A. Green. | 1579. J. E. Piper. |
| 1503. A. Strauss. | 1601. A. M. Clark. |
| 1512. W. Husband & F. B. Dering. | 1610. A. M. Clark. |
| 1517. G. F. Griffin. | 1627. A. M. Clark. |
| 1523. R. Waygood. | 1668. E. A. Chamerooy. |
| 1525. W. H. Wilkinson. | 1687. C. D. Abel. |
| 1530. R. Moore. | |

From Commissioners of Patents' Journal, November 10.

PATENTS SEALED.

- | | |
|--|-----------------------------------|
| 1540. R. Leake and J. Beevers. | 1645. C. L. Taverdon & J. Moret. |
| 1547. C. Vero. | 1681. H. Hall and J. A. Mason. |
| 1548. T. Shinton. | 1737. W. R. Lake. |
| 1549. W. D. Brown. | 1740. A. M. Clark. |
| 1553. F. W. and W. J. Crossley. | 1771. J. Drabble & J. S. Raworth. |
| 1555. G. Dixon. | 1783. I. B. Guest. |
| 1558. C. Farrow. | 1821. J. H. Johnson. |
| 1561. W. Taylor. | 1826. W. Rye. |
| 1572. W. Gadd and J. Moore. | 1831. C. E. Brooman. |
| 1582. V. G. Bell. | 1833. C. E. Brooman. |
| 1586. W. Walker. | 1899. W. Barton. |
| 1602. W. R. Lake. | 1919. J. H. Johnson. |
| 1606. H. J. H. King, J. Auchin-vole, and A. Patrick. | 1937. W. Müller and G. Englert. |
| 1607. T. Briggs. | 2130. W. E. Newton. |
| 1618. W. R. Lake. | 2483. J. Kirk and J. Batstone. |
| 1626. J. F. Spencer. | 2592. T. R. Shaw. |
| | 2712. J. F. C. Carle. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

- | | |
|-------------------------------|--------------------------------|
| 2993. A. C. St. P. de Sincay. | 2865. W. Esplen and J. Clarke. |
| 2844. H. J. Sanders. | 2873. F. G. Bennett. |
| 2904. A. V. Newton. | 2877. C. Mole. |
| 3011. J. Ellis, jun. | 2881. N. Beard and J. Malden. |
| 3168. H. A. Bonneville. | 2959. T. J. Perry. |
| 2876. R. Swires. | 2883. J. Eastwood. |
| 2897. T. Whitwell. | 2913. G. H. Goodman & E. Bow. |

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2772. R. Wilson.